Transparent Charity Using BlockChain

Fathima Dilsha T[1], Mohammed Nabeel P U[2], Muhammed Sabik Salim[3], Sahal P T[4], Anaswara Dinesh[5]

[1,2,3,4] *Student, Computer Science Engineering, IES College of Engineering, Kerala*
[5]*Assistant Professor, Computer Science Engineering, IES College of Engineering, Kerala*
Email_id: dilmoidi@gmail.com, nabeelomer007@gmail.com, msabiksalim@gmail.com, 777sahal@gmail.com, anaswara@iesce.info

Abstract

People today are eager to help society and want to donate to causes they believe in. However, many hesitate because they don't trust the current system, worrying that their money might not be used properly. Many charities and NGOs need funds to do their good work, but they often struggle to gain people's trust. To solve this, we have proposed a new system using blockchain technology. This system will make the donation process more transparent and trustworthy. With blockchain, donors can see exactly where their money is going, which builds trust between them and the charities. Blockchain is a powerful tool for charities because it promotes transparency and reduces the risk of fraud. Unfortunately, many charities don't use it because they don't fully understand how it works or how it can benefit them.

Keywords: Blockchain Technology, Transparency, Trust, Fraud Prevention, Charity Donations, NGOs, Technical Expertise

DOI: https://doi.org/10.5281/zenodo.15123190

1. Introduction

In an era where social responsibility is paramount, individuals are eager to contribute to meaningful causes. However, a significant trust gap in existing donation systems often discourages potential donors. Concerns about transparency, misuse of funds, and fraud create barriers to effective charitable giving, posing challenges for NGOs and organizations reliant on public support.

Blockchain technology offers a transformative solution to these issues. With its decentralized and tamper-proof nature, blockchain ensures transparency, enabling donors to track their contributions and fostering trust. Features like smart contracts, user-friendly interfaces, and audit modules further enhance accountability and efficiency.

This paper explores how blockchain can address these challenges by integrating transparency, security, and trust into charitable donation systems, paving the way for a more reliable and impactful model of giving.

1.1. Blockchain Network: The back bone of the system, where all transactions and data are recorded on a decentralized ledger. The blockchain network will be permissioned, allowing only verified participants (e.g., charities, donors, auditors) to participate.

1.2. Smart Contracts: Smart contracts are self-executing contracts that can automatically enforce the terms of an agreement. In a charity system, smart contracts could be used to ensure that donations are only released when certain conditions are met, such as a certain amount of money being raised or a specific project being completed.

1.3. User Interface (UI): A user-friendly web and mobile interface that allows donors to browse charity projects, make donations, and track the impact of their contributions. Charities will use the same interface to create fundraising campaigns and provide updates on how funds are being used.

1.4. Audit Module: An integrated audit system that periodically checks the consistency and accuracy of transactions recorded on the blockchain. This module ensures that all data is authentic and aligns with the reported activities of the charities.

2. Literature Survey

- Singh et al. [1]: Proposed a blockchain-based system for tracking donations transparently using smart contracts to update donors on the use of their funds, addressing trust issues and ensuring proper fund utilization.
- Shaheen et al. [2]: Developed a blockchain-based donation system that enhances transparency and security by removing intermediaries and allowing donors to track their money. A user-friendly website was included for accessibility.
- Saranya et al. [3]: Discussed an Ethereum-based blockchain crowdfunding platform enabling direct donations without intermediaries, promoting transparency and trust.
- Feki et al .[4]: Integrated NFTs into blockchain donation platforms, offering dual funding strategies and showcasing a prototype using Ethereum and Vue.js for enhanced efficiency and tracking.
- Swati et al. [5]: Proposed a decentralized platform on Ethereum to ensure real-time tracking of donations with smart contracts and cryptographic security, fostering trust in charitable giving.
- Shelke et al. [6]: Presented a blockchain solution for crowdfunding to ensure secure, transparent, and immutable transactions, enhancing project credibility and fundraising success.
- Sivaganesan. [7] : Introduced a blockchain-based system with "Authentication Proof" to secure data in Industry 4.0 environments, emphasizing data protection across networks.
- Santana and Albareda [8]: Analyzed DAOs (Decentralized Autonomous Organizations) through theoretical perspectives and proposed a unified model to clarify DAO principles and guide future research.
- Alexopoulos et al. [9]: Demonstrated how blockchain enhances security in Trust Management systems by using graph theory to prevent common security threats.
- Golosova [10]: Reviewed blockchain implementations, evaluating their effectiveness in addressing trust, transparency, security, and data reliability through comparative case studies.
- Saleh et al.[11]: Designed a blockchain platform to track charitable donations in real time, ensuring transparency and building trust through immutable transaction records.
- Agarwal et al. [12]: Proposed a blockchain-based charity system that issues tradeable certificates for donations, enhancing transparency and accountability.

- Arshad et al. [13]: Identified fraud indicators in non-profits, offering strategies for risk management and fraud prevention through literature and case study analysis.
- Hyndman and McConville [14]: Evaluated transparency in U.K. charities' reporting, highlighting gaps in performance disclosure and proposing a framework for improving accountability.
- Kshetri[15]: Explored blockchain's potential to address socio-economic challenges in the Global South, highlighting its role in improving transparency, trust, and transaction efficiency.

3. Review of Methodology

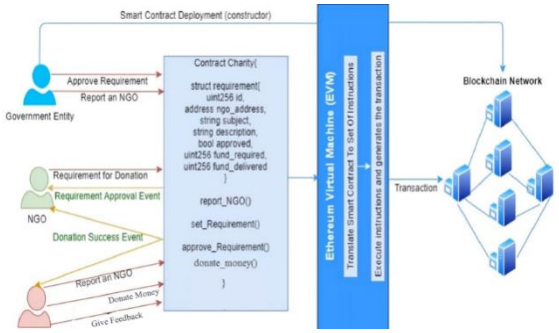

Figure 1: System Design

The Transparent Charity Application leverages blockchain for secure, transparent, and efficient donation management. Key stakeholders include donors, NGOs, contractors, and administrators. Donors track contributions in real-time, NGOs update project details, contractors ensure legitimacy, and admins oversee operations. Blockchain and smart contracts automate fund distribution, enhancing trust, accountability, and system integrity.

3.2. User Module:

The User Module ensures secure and transparent interactions, enabling donors to:

a. Register and LogIn: Secure access with unique credentials and robust authentication protocols.
b. Donate: Select charities or projects, execute secure transactions recorded on the blockchain.
c. Provide Feedback: Submit suggestions or report issues for resolution.
d. Track Donations: Monitor donation history and fund utilization.

3.3. NGO Module:

This module empowers NGOs to:

a. Register and Verify: Undergo document-based verification for platform approval.
b. Manage Charity Details: Share project goals, funding needs, and updates to build donor trust.
c. Oversee Donations: Transparently allocate and report on received funds, showcasing progress.

3.4. Contractor Module:

The Contractor Module focuses on:

a. NGO Verification: Assess credibility and periodically review performance.
b. Monitoring Funds: Ensure proper donation allocation and enhance transparency.

c. Managing Feedback: Address user concerns and maintain satisfaction.

3.5. Blockchain Module:

The Blockchain Module ensures security and accountability through:

a. Smart Contracts: Automate fund releases upon meeting predefined goals.

b. Transaction Tracking: Maintain an immutable ledger and enable real-time donor monitoring.

4. Review of Datasets

A review of datasets for a blockchain-based transparent charity application ensures that the data used supports the system's goals of transparency and trust while being comprehensive and accurate.

4.1. Donation Data

The Donation Data comprises both transaction records and donation history. Transaction records capture essential details such as donor identities, donation amounts, dates, and the recipient charities. These records are important in maintaining a detailed and immutable account of all transactions, thus enhancing transparency and facilitating thorough audits. Ensuring the accuracy and completeness of these records, along with their seamless integration into blockchain technology is crucial for preserving their immutability. Additionally, donation history tracks past donations, providing valuable insights for trend analysis and evaluating the long-term impact of contributions. Maintaining consistency and historical accuracy in this dataset is vital for its effectiveness.

4.2. Charity Information

The dataset includes both charity profiles and project details. Charity profiles offer critical insights such as mission statements, operational details, and funding needs, which lend context and legitimacy to the organizations and assist donors in making informed decisions. The accuracy and completeness of these profiles are crucial, as they must be regularly updated and aligned with the blockchain system to maintain their relevance. Additionally, project details provide specific information about individual charity projects and their associated funding goals, ensuring donors are well-informed about how their contributions are utilized. The emphasis here is on ensuring that these details are both accurate and clearly communicated, with a strong integration into the donation tracking system to maintain transparency and accountability.

4.3 Donor Information

These data consist of donor profiles and donor history. Donor profiles contain personal information such as names, contact details, and preferences, which help personalize the donor experience and facilitate communication. Ensuring data protection and privacy is paramount. Donor history includes records of past donations and interactions, which help understand donor behavior and preferences. Accuracy and integration with current donation records are critical for a complete view of donor activity.

4.4 Smart Contract Specifications

Involves contract terms and contract performance data. Contract terms include the conditions and rules encoded in smart contracts, which automate and enforce donation processes and fund allocation. The accuracy and functionality of these contracts are crucial. Contract performance data consists of logs of smart contract executions, tracking how contracts are executed and ensuring compliance with their terms. This dataset must accurately reflect performance and highlight any issues or anomalies.

4.5 Financial Data

Financial data includes fund allocation and expense tracking. Fund allocation data details how funds are distributed among projects or purposes, ensuring that donations are used as intended and supporting financial transparency. Accuracy in these records is crucial for reporting and accountability. Expense tracking data provides information on charity expenditures, including administrative and project costs, helping to understand how funds are spent and ensuring consistency with allocated amounts.

4.6 System Performance Data

Performance data encompasses transaction times and error logs. Transaction times data measures how quickly transactions are processed, which is important for assessing system efficiency. Error logs document system errors and issues, helping identify and resolve problems to maintain smooth operation.

4.7 User Interaction Data

The dataset includes information on dashboard usage and feedback/support requests. Dashboard usage data captures how users engage with their dashboards, offering insights into usability, user behavior, and identifying areas that may require enhancement. Meanwhile, feedback and support requests provide crucial details about user concerns and experiences, enabling the system to be refined and improved based on real-world user interactions. Both aspects of this dataset are vital for optimizing the user experience and ensuring the system meets user needs effectively.

5. Implementation of a Blockchain-Based Transparent Charity Application

The implementation of the proposed blockchain-based charity application is guided by comprehensive hardware, software, functional, and non-functional requirements to ensure a secure, scalable, and efficient platform.

5.1. Hardware Requirements:

The hardware specifications ensure sufficient performance for real-time transactions and blockchain integration:

a. Processor: Intel Pentium Core i3 or higher for efficient transaction and data handling.
b. Primary Memory: 4GB RAM or more for seamless interaction and real-time tracking.
c. Storage: Minimum 320GB hard disk to store records, logs, and system files.
d. Additional Requirements: A stable internet connection for blockchain network synchronization.

5.2. Software Requirements:

The software stack supports the development and deployment of a robust application:

a. Operating System: Windows 8 or higher for compatibility with development tools.
b. Front-End Development: HTML and CSS for creating a responsive user interface.
c. Back-End Development: Python and Node.js for server-side logic and MySQL for database management.
d. Blockchain Tools: Truffle Suite and Ganache for developing and testing smart contracts.
e. Development Environment: Visual Studio Code or similar IDE for efficient coding and debugging.

5.3. Functional Requirements:

The system includes core functionalities to ensure user satisfaction and operational transparency:

- **User Registration and Authentication**:

- Secure registration and login for donors, NGOs, and administrators.
- Authentication protocols to ensure privacy and data security.

- **Donation Management**:
  - Secure donation processing with blockchain recording for immutability and transparency.
  - Smart contracts for automated fund distribution based on predefined conditions.
- **Transparency and Tracking**:
  - Real-time tracking of donation flow, enhancing user trust.
  - Generation of detailed reports on fund utilization and project progress for stakeholders.
- **Security Features**:
  - Robust mechanisms to prevent unauthorized access and ensure data integrity.
  - Blockchain implementation to eliminate fraud risks and maintain transparency.
- **Administrative Functions**:
  - User management, NGO verification, and oversight of donation activities.
  - Regular auditing through detailed system reports to ensure accountability.
- **Scalability and Accessibility**:
  - Support for growing user and transaction volumes without compromising performance.
  - Compatibility across diverse devices and internet connectivity levels for a global audience.

5.4. Non-Functional Requirements:

These requirements ensure the application operates efficiently and reliably:

a. Performance: Ability to handle concurrent transactions with minimal delay.

b. Reliability: High availability and minimal downtime to ensure consistent service.

c. Usability: Intuitive interface for all user groups, including donors and NGOs.

d. Compliance: Adherence to legal and regulatory standards for data privacy and blockchain usage.

6. Result and Discussion

The analysis concludes that blockchain technology has significant advantages over traditional charitable giving systems, particularly in terms of transparency, cost effectiveness, and fraud protection. The blockchain's decentralized and immutable database enables real-time tracking of donations, giving contributors unprecedented insight into how their funds are used. This level of transparency differs from traditional systems, in which donations frequently go via many middlemen, making it impossible for contributors to verify the use of their funds. Furthermore, blockchain lowers transaction costs by eliminating intermediaries and automating procedures using smart contracts, ensuring that more funds reach their intended recipients.

However, the adoption of blockchain in the charity sector faces significant challenges. Many charitable organizations, especially smaller organizations, lack the technical expertise and resources required to implement blockchain effectively. The initial costs associated with developing the necessary infrastructure and acquiring

technical skills can be prohibitive.Furthermore, because the legal environment is still changing, there are still unknowns surrounding blockchain technology, which presents dangers for businesses thinking about implementing this technology.

Overall, while blockchain has the potential to revolutionize charitable donations by building trust, improving transparency, and reducing costs, its adoption is currently limited by practical barriers. Traditional systems, though less efficient and transparent, continue to be widely used due to their established presence and lower barriers to entry. To make blockchain more widespread in the charity sector, concentrated efforts in education, regulatory alignment, and technical assistance must be made to assist organizations in navigating the hurdles and fully utilizing the benefits of this technology

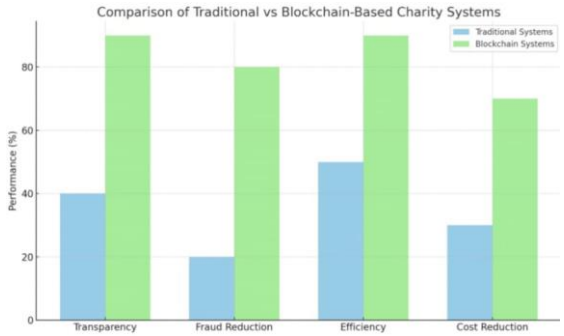

Figure 1: Comparison of traditional vs blockchain-based charity system

7. References

[1]. Singh, R. Rajak, H. Mistry and P. Raut, "Aid, Charity and Donation Tracking System Using Blockchain," 2020 4th International Conference on Trends in Electronics and Informatics (ICOEI)(48184), Tirunelveli, India, 2020, pp. 457-462, doi: 10.1109/ICOEI48184.2020.9143001.

[2]. E. Shaheen et al., "A Track Donation System Using Blockchain," 2021 International Conference on Electronic Engineering (ICEEM), Menouf, Egypt, 2021, pp. 1-7, doi: 10.1109/ICEEM52022.2021.9480649.

[3]. S. Saranya, S. P. Muvvala, V. Chauhan and R. Satwik, "Crowdfunding Charity Platform Using Blockchain," 2022 International Conference on Inventive Computation Technologies (ICICT),

[4]. E. Feki, K. Boukadi, F. Loukil and M. Abed, "BELONG: Blockchain basEdpLatformfOr donation & social project fuNdinG," 2022 IEEE/ACS 19th International Conference on Computer Systems and Applications (AICCSA), Abu Dhabi, United Arab Emirates, 2022, pp. 1-8, doi: 10.1109/AICCSA56895.2022.10017836.

[5]. J. Swati, P. Nitin, P. Saurabh, D. Parikshit, P. Gitesh and S. Rahul, Blockchain based Trusted Secure Philanthropy Platform: Crypto-GoCharity, 2022 6th International Conference On Computing,

Communication, Control And Automation (ICCUBEA, Pune, India, 2022, pp. 1-8, doi: 10.1109/ICCUBEA54992.2022.10011026.

[6]. P. Shelke, S. Zanjal, R. Patil, D. Desai, H. Chavan and V. Kulkarni, Blockchain Technology Based Crowdfunding Using Smart Contracts,2022 International Conference on Augmented Intelligence and Sustainable Systems (ICAISS), Trichy, India, 2022, pp. 939-943, doi: 10.1109/ICAISS55157.2022.10010749.

[7]. D. Sivaganesan, Smart contract based industrial data preservation on block chain, Journal of Ubiquitous Computing and Communication Technologies (UCCT), vol. 2, no. 01, pp. 39-47, 2020.

[8]. Carlos Santana and Laura Albareda, Blockchain and the emergence of Decentralized Autonomous Organizations (DAOs): An integrative model and research agenda Technological Forecasting and Social Change, vol. 182, no. 2022, pp. 121806, ISSN 0040-1625.

[9]. N. Alexopoulos, J. Daubert, M. Mühlhäuser and S. M. Habib, Beyond the hype: On using blockchains in trust management for authentication, in 2017 IEEE Trustcom/BigDataSE/ICESS, IEEE, pp. 546-553, August 2017.

[10]. A. R. J. Golosova, The advantages and disadvantages of the blockchain technology, Electronic and electrical engineering (AIEEE), pp. 1-6, 2018.

[11]. H. Saleh, S. Avdoshin and A. Dzhonov, Platform for Tracking Donations of Charitable Foundations Based on Blockchain Technology,2019 Actual Problems of Systems and Software Engineering (APSSE), Moscow, Russia, 2019, pp. 182-187,

[12]. P. Agarwal, S. Jalan and A. Mustafi, Decentralized and financial approach to effective charity,2018 International Conference on Soft-computing and Network Security (ICSNS), Coimbatore, India, 2018, pp. 1-3,

[13]. Roshayani Arshad, Wan Ainul Asyiqin, Wan Mohd Razali, Noorbijan Abu Bakar. Catch the “warning signals”: The fight against fraud and abuse in non-profit organisations , Procedia Economics and Finance 28, 114-120, 2015

[14]. Noel Hyndman, Danielle McConville . Transparency in reporting on charities’ efficiency: A framework for analysis Nonprofit and Voluntary Sector.Quarterly 45 (4), 844-865, 2016

[15]. Kshetri, N. (2017) ‘Will blockchain emerge as a tool to break the poverty chain in the Global South, Third World Quarterly, 38(8), pp. 1710–1732. doi: 10.1080/01436597.2017.1298438.